

**Sonos, Inc.’s Opp’n to Google LLC’s
Motion *In Limine* No. 4**

EXHIBIT C
(Filed Under Seal)

SONOS

IP License Model

7/12/2018

CONFIDENTIAL | FRE 408 | PAGE 1

IP License Model

I. Overview

II. Licensing Rates (pages 2—13)

Step 1: Feature List of Smart Speakers

Step 1A: Features — Desirability and Marketability

Step 1B: Features — Sonos contributing IP, U.S.

Step 1C: Features — Sonos contributing IP, ROW

Step 2: Licensing Rate Calculation

Step 2A: Gross Profit

Step 2B: Per-Unit Rates — Google, U.S.

Step 2C: Per-Unit Rates — Google Ecosystem, U.S./ROW

III. Supporting Materials (pages 14—54)

I. Overview

Goal: Obtain a royalty rate that reflects the value attributable to the features of Google's products that are covered by the Sonos patent portfolio.

How to Get There:

1. Round 1: identify the commercially desirable/marketable features found today in Google's smart speakers, and how those features are presented to consumers.
2. Round 2: determine Sonos' IP contribution with respect to those features.
3. Calculate a royalty rate using (1) the identified features, (2) Sonos's contribution, and (3) the estimated profits of Google's smart speakers.

II. Licensing Rates

Step 1: Feature List

We want to promote innovation across the industry, and our framework was built to support that desire by taking into account the innovation of others. Ultimately, our rate goes up for a pure copy of Sonos (not very exciting) and goes down as others innovate on top of Sonos (exciting and forces us to innovate even more).

To start, irrespective of IP, we identified a list of commercially marketed features found today in smart speakers. **FOUR** main categories emerged:

- 1. Connected Playback Device.** A stand-alone, network-enabled media player, speaker, or playback device.
 - 12 Characteristic Features
 - 11 used by Max; 9 Home; 9 Mini; 8 Cast Dongle
 - Up to 7 Characteristics used by Google are covered by Sonos patents
- 2. Voice Assistant Device.** A stand-alone player, speaker, or playback device with a built-in voice assistant.
 - 2 Characteristic Features
 - 2 used by Max; 2 Home; 2 Mini; 2 Cast Dongle
 - 0 Characteristics covered by Sonos patents
- 3. Multi-device Platform.** Multiple devices working together.
 - 5 Characteristic Features
 - 5 used by Max; 5 Home; 5 Mini; 5 Cast Dongle
 - 3 Characteristics used by Google are covered by Sonos patents
- 4. Premium Sound Experience.** Hardware and software features of a playback device to produce premium sound.
 - 8 Characteristic Features
 - 7 used by Max; 0 Home; 0 Mini; 0 Cast Dongle
 - 4 Characteristics used by Max are covered by Sonos patents

* Features and enabling technology within each category are provided along with their definitions in the "Supporting Materials" section at the back.

II. Licensing Rates

Step 1A: Desirability and Marketability

A product's feature offering drive sales and ultimately its profits. Looking to how these features were presented and/or valued by consumers/reporters, we were able to weight each category accordingly:

	Google Mini	Google Home	Google Max	Cast Dongle
Connected Device	37%	37%	25%	80%
Voice Assistant	44%	44%	30%	0%
Multi-Device	19%	19%	24%	20%
Premium Sound	0%	0%	21%	0%

* The values are supported by material shown in their respective "Supporting Materials" section at the back.

II. Licensing Rates

Step 1B: Sonos IP Contribution U.S. (as of 7/12/2018)

Starting in 2002, Sonos created a new market category: the modern version of the smart speaker. Over those years, Sonos devoted significant time and money inventing new ideas that made their way into these kinds of products. We protected many of those new ideas with patents.

We want to drive innovation across the industry and this framework shows that: a pure Sonos copy would overlap a large amount of Sonos IP. However, if a company innovated on top of Sonos with new features that drive demand, then they would overlap less of Sonos IP. As seen below, we sought to value only Sonos' contribution for which we have IP in the U.S. to those four main feature categories.

	Google Mini	Google Home	Google Max	Cast Dongle
Connected Device	33%	33%	58%	25%
Voice Assistant	0%	0%	0%	0%
Multi-Device	60%	60%	60%	60%
Premium Sound	0%	0%	50%	0%

* The values are supported by material shown in their respective "Supporting Materials" section at the back.

II. Licensing Rates

Step 1B: Patent Families With Identified Patents

As of 7/12/2018, we have identified 53 utility patents from 17 different Sonos utility patent families that cover aspects of Google products.

	17 Patent Families Covering Google Today	Total Patents per Category
Connected Playback Device (Standalone)	8	13
Voice Assistant Device (Standalone)	0	0
Multi-Device Platform	5	31
Premium Sound Device	4	9
Total	17	53

II. Licensing Rates

Step 1B: Patent Families Without Identified Patents

Today, Sonos has 290 utility patent families (some containing issued patents and some containing only pending patent applications). 82 of those families include issued patents that cover aspects of Sonos products. As previously mentioned, 17 of those families include issued patents that cover aspects of Google products, leaving 273 total utility patent families that Google is currently not known to practice.

	290 Total Patent Families	273 Additional Patent Families Not Included	82 Patent Families Practiced by Sonos Today
Connected Playback Device (Standalone)	114	106	31
Voice Assistant Device (Standalone)	17	17	1
Multi-Device Platform	84	79	19
Premium Sound Device	75	71	31
Total	290	273	82

II. Licensing Rates

Step 1C: Sonos IP Contribution, ROW (as of 7/12/2018)

Sonos has patent portfolios in Europe, Japan, and China. Given that the breadth of these portfolios (today) is less than that found in the U.S. portfolio, we separated the U.S. from the rest of the world (ROW). Particularly, we sought to value Sonos' contribution for which we have IP in Europe to those four main feature categories:

	Google Mini	Google Home	Google Max	Cast Dongle
Connected Device	0%	0%	7%	0%
Voice Assistant	0%	0%	0%	0%
Multi-Device	20%	20%	20%	20%
Premium Sound	0%	0%	25%	0%

* The values are supported by material shown in their respective "Supporting Materials" section at the back.

II. Licensing Rates

Step 2A: Gross Profit

Google is using smart speakers as a “loss leader” to inject Google Assistant into as many homes (and rooms) as possible, with the ultimate aim to earn profit on its core business. Instead of attempting to frame how much profit Google will ultimately derive from the sale of such hardware and the obtainment of households, we instead looked to more traditional viewpoint — hardware margin — as it relates to gross profit. Using very conservative figures, profit looks like:

	Mini	Home	Max	Cast Dongle
MSRP	\$49	\$129	\$399	\$35
COGM	49%	49%	49%	49%
Channel Margin	20%	20%	20%	20%
Logistics	5%	5%	5%	5%
Gross Profit	\$12.74	\$33.54	\$103.74	\$9.10

II. Licensing Rates

Step 2B: Per-Unit Rate – Google, U.S.

Google Mini	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	37%		33%				\$1.56	
Voice Assistant	44%	X	0%	X	\$12.74	=	\$0.00	\$3.01
Multi Device	19%		60%				\$1.45	
Premium Sound	0%		0%				\$0.00	

Google Home	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	37%		33%				\$4.10	
Voice Assistant	44%	X	0%	X	\$33.54	=	\$0.00	\$7.92
Multi Device	19%		60%				\$3.82	
Premium Sound	0%		0%				\$0.00	

Google Max	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	25%		58%				\$14.00	
Voice Assistant	30%	X	0%	X	\$103.74	=	\$0.00	\$40.87
Multi Device	24%		60%				\$14.94	
Premium Sound	21%		50%				\$10.89	

Cast Dongle	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	80%		25%				\$2.26	
Voice Assistant	0%	X	0%	X	\$9.10	=	\$0.00	\$2.91
Multi Device	20%		60%				\$1.09	
Premium Sound	0%		0%				\$0.00	

II. Licensing Rates

Step 2C: Per-Unit Rate – Google, ROW

Google Mini	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	37%		0%				\$0.00	
Voice Assistant	44%	X	0%	X	\$12.74	=	\$0.00	\$0.48
Multi Device	19%		20%				\$0.48	
Premium Sound	0%		0%				\$0.00	

Google Home	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	37%		0%				\$0.00	
Voice Assistant	44%	X	0%	X	\$33.54	=	\$0.00	\$1.27
Multi Device	19%		20%				\$1.27	
Premium Sound	0%		0%				\$0.00	

Google Max	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	25%		7%				\$2.07	
Voice Assistant	30%	X	0%	X	\$103.74	=	\$0.00	\$12.24
Multi Device	24%		20%				\$5.08	
Premium Sound	21%		25%				\$0.00	

Cast Dongle	Feature Value		Sonos Contribution		Profit		License	Total License
Connected Device	80%		0%				\$0.00	
Voice Assistant	0%	X	0%	X	\$9.10	=	\$0.00	\$0.36
Multi Device	20%		20%				\$0.36	
Premium Sound	0%		0%				\$0.00	

II. Licensing Rates

Step 2C: Per Unit Rate - Ecosystem, U.S./ROW

Google's ecosystem products fall into two categories (1) speakers that utilize Chromecast as the **primary** platform for obtaining and controlling audio (e.g., JBL's Link series of speakers), and (2) Chromecast-enabled speakers where Chromecast is **secondary** to other, proprietary means of obtaining and controlling audio (e.g., Sony's Music Center platform wireless speakers). Google's contribution to the marketability of these products differs*. To determinate a rate for these products, we conservatively used Google Home's profit margins.

Chromecast Primary Products:

Google features are the primary drivers in the marketing of these products. For example, for JBL's Link products, most features touted on the site for its Link products relates to Google functionality. Sony's LF speaker also prominently discusses Google features. Given the importance of Google features (~80%), the license rate for these products is **\$7.24** per unit in the U.S and **\$1.28** per unit ROW.

Chromecast Secondary Products:

These products can be controlled either by their own proprietary software, or by a Google device, such as the Chromecast/Home apps or a Google Home speaker. These products do not have embedded mics, there is thus no value attributable to voice. Rather, any value that would be attributable to voice is instead in the multi-device category, as one device is used to control. Of the websites analyzed, Chromecast/Google Home is featured in ~25% of the feature callouts. This results in a license rate of **\$3.48** per unit in the U.S. and **\$0.88** per unit ROW.

* The values are supported by material shown in their respective "Supporting Materials" section at the back.

Supporting Materials

Step 1: Feature List

Connected Device Features

Marketed Feature	Characteristics of the Marketed Feature	Enabling Tech
Connected Playback Device (Standalone)	Connected Playback Device Setup	(1) Player Setup (2) Streaming Service Setup
	Wi-Fi Streaming	(1) LAN/local source (2) remote source
	Support for only one streaming service	(1) register a single service with playback device (2) cloud queue
	Speaker Support for Multiple Streaming Services	(1) switching between music services (2) universal search
	Line-in	(1) physical line-in source switching (2) virtual line-in (e.g., bluetooth) source switching
	Line-out	□
	Bluetooth	(1) Setup (2) Real-time streaming
	Control Interface (SW)	(1) Guest Access (2) Native control (3) direct control (third-party control of a device)
	Control Interface (HW)	(1) hardware control interface on connected playback device
	Power and Power Management	Power save technology
	Fault Detection/Recovery	(1) Physical Fault Detection (2) Playback Fault Detection
	Features Updates (SW)	(1) firmware/configuration (2) app store (3) skills

Voice Assistant Device Features

Marketed Feature	Characteristics of the Marketed Feature	Enabling Tech
Voice Assistant Device (Standalone)	Smart Assistant (SW)	(1) machine learning
		(2) search expertise
	Voice Detection	(1) mic array
		(2) beam forming (SW)
		(3) wake word engine (SW) (4) arbitration (SW) (5) voice capture processing

Step 1: Feature List

Multi-Device Features

Marketed Feature	Characteristics of the Marketed Feature	Enabling Tech
Multi-Device Platform	Multi-Device Playback Control (SW)	(1) Group Content/Playback Control
		(2) Group Formation
		(3) Group Volume
		(4) zone scenes
		(5) group navigation and maintenance
		(6) source switching
		(7) multiple controllers
	Multi-Device Playback (SW)	(1) synchronized playback
		(2) audio distribution
	Multi-Device Voice	(1) Multi device voice input
		(2) Multi device voice output
	Smart Home Integration (SW)	(1) output/action device(s)
		(2) IoT Scenes
		(3) educational and entertainment functions
	Multi-Device Networking	(1) ad hoc/STP configurations (SW)
		(2) direct routing/communication from GC to GM (SW)
		(3) Fault Tolerance
		(4) Designating group coordinator
		(5) Changing group coordinator
		(6) Setup

Premium Sound Features

Marketed Feature	Characteristics of the Marketed Feature	Enabling Tech
Premium Sound Device	Orientation	(1) sound shaping based on orientation
	Bonded Zones	(1) stereo pair
		(2) consolidated players (SUB; HT 5.1 etc)
	Custom Transducers	(1) woofers
		(2) tweeters
	Calibration	(1) calibration audio capture using built-in mics (HW)
		(2) calibration audio capture using external mics
		(3) audio processing algorithm calculation (SW)
	Lossless Streaming	(1) sufficient processing power and network capabilities (HW)
		(2) compatible DSP (SW)
	Sound Field Control	(1) purpose-designed transducers? (HW)
		(2) audio signal processing (SW)
		(3) acoustic baffle?
	Custom Amplifiers	(1) custom amplifier audio processing
	Enclosure	(1) Speaker Grill

CONFIDENTIAL | FRE 408 | PAGE 16

Step 1: Included US Patents Overview

Marketed Feature	Feature Category	Google Max Feature Covered by Sonos Patent
Connected Playback Device (Standalone)	Connected Playback Device Setup	1 patent
	Wi-Fi Streaming	
	Support for only one streaming service	4 patents
	Speaker Support for Multiple Streaming Services	
	Line-in	1 patent
	Line-out	
	Bluetooth	
	Control Interface (SW)	3 patents
	Control Interface (HW)	1 patent
	Power and Power Management	2 patents
	Fault Detection/Recovery	1 patent
	Features Updates (SW)	
Voice Assistant Device (Standalone)	Smart Assistant (SW)	
	Voice Detection	
Multi-Device Platform	Multi-Device Playback Control (SW)	21 patents
	Multi-Device Playback (SW)	8 patents
	Multi-Device Voice	2 patents
	Smart Home Integration (SW)	
	Multi-Device Networking	
Premium Sound Device	Orientation	2 patents
	Bonded Zones	4 patents
	Custom Transducers	
	Calibration	2 patents
	Lossless Streaming	
	Sound Field Control	1 patent
	Custom Amplifiers	
	Enclosure	

Step 1: U.S. Patents Included

Sonos Patent Family	Patent Number		Marketed Feature
	9,727,302	9,733,893	
	9,182,777	9,176,520	
	9,164,532	9,733,891	
	9,218,017	9,733,892	
SYSTEM AND METHOD FOR SYNCHRONIZING OPERATIONS AMONG A PLURALITY OF INDEPENDENTLY CLOCKED DIGITAL DATA PROCESSING DEVICES	9,195,258	8,938,637	
	9,207,905	8,370,678	Multi-Device Platform
	9,170,600	8,689,036	
	9,213,356	9,348,354	
	9,778,900	9,189,011	
	9,740,453	EP1654614	
	9,727,304	EP2648111	
METHOD AND SYSTEM FOR CONTROLLING AMPLIFIERS	9,252,721	9,246,442	Connected Playback Device (Standalone)
METHOD AND APPARATUS FOR CONTROLLING MULTIMEDIA PLAYERS IN A MULTI-ZONE SYSTEM	8,588,949 (90/013,423)	7,571,014 (90/013,882)	Multi-Device Platform
PLAYBACK DEVICE CONNECTION	9,960,969		Connected Playback Device (Standalone)
CONTROLLING AND MANIPULATING GROUPINGS IN A MULTI-ZONE MEDIA SYSTEM	8,843,228	8,934,997	
	9,749,760	9,860,657	Multi-Device Platform
	9,344,206		
	9,219,959 (90/013,756)	8,788,080	
MAKING AND INDICATING A STEREO PAIR	9,202,509 (90/013,859)	EP2695400	Premium Sound Device
	9,928,026	EP3059980	
SMART LINE-IN PROCESSING	9,686,606		Connected Playback Device (Standalone)
SHAPING SOUND RESPONSIVE TO SPEAKER ORIENTATION	9,042,556	EP2735171	Premium Sound Device
	9,748,647		Premium Sound Device
SYSTEMS AND METHODS FOR NETWORKED MUSIC PLAYBACK	9,860,589		Connected Playback Device (Standalone)
ACOUSTIC SIGNATURES	8,930,005		Connected Playback Device (Standalone)
	9,519,454		
DETECTING IMPROPER POSITION OF A PLAYBACK DEVICE	9,367,611		Connected Playback Device (Standalone)
AUDIO SETTINGS BASED ON ENVIRONMENT	9,219,460	9,872,119	Premium Sound Device Premium Sound Device
	9,654,459	9,363,255	
CLOUD QUEUE	9,942,215	9,648,071	Connected Playback Device (Standalone)
DEVICE GROUP IDENTIFICATION	9,348,824		Multi-Device Platform
PLAYBACK DEVICE CONTROL	9,671,780	EP3100156	Connected Playback Device (Standalone)
MULTI-CHANNEL PLAYBACK OF AUDIO CONTENT	9,973,851		Premium Sound Device
DEFAULT PLAYBACK DEVICE	9,826,306	9,820,039	Multi-Device Platform

Explanation of Step 1 Percentages—United States

	Google Home Max	Google Home	Google Mini	Cast Dongle Devices
	58%	33%	33%	25%
Connected Playback Device (Standalone)	<ul style="list-style-type: none"> •12 Characteristics •11 Characteristics relevant to Google Max •7 Characteristics with Sonos blocking patents •8 Patent families, 13 patents 	<ul style="list-style-type: none"> •12 Characteristics •9 Characteristics relevant to Google Home •4 Characteristics with Sonos blocking patents 	<ul style="list-style-type: none"> •12 Characteristics •9 Characteristics relevant to Google Mini •4 Characteristics with Sonos blocking patents 	<ul style="list-style-type: none"> •12 Characteristics •8 Characteristics relevant to Cast Dongle •3 Characteristics with Sonos blocking patents
Voice Assistant Device (Standalone)	0% <ul style="list-style-type: none"> •2 Characteristics •2 Characteristics relevant to Google Max 	0% <ul style="list-style-type: none"> •2 Characteristics •2 Characteristics relevant to Google Home 	0% <ul style="list-style-type: none"> •2 Characteristics •2 Characteristics relevant to Google Mini 	0% <ul style="list-style-type: none"> •2 Characteristics •0 Characteristics relevant to Cast Dongle.
Multi-Device Platform	60% <ul style="list-style-type: none"> •5 Characteristics •5 Characteristics relevant to Google Max •3 Characteristics with Sonos blocking patents •5 Patent families, 31 patents 	60% <ul style="list-style-type: none"> •5 Characteristics •5 Characteristics relevant to Google Home •3 Characteristics with Sonos blocking patents •5 Patent families, 31 patents 	60% <ul style="list-style-type: none"> •5 Characteristics •5 Characteristics relevant to Google Mini •3 Characteristics with Sonos blocking patents •5 Patent families, 31 patents 	60% <ul style="list-style-type: none"> •5 Characteristics •5 Characteristics relevant to Cast Dongle •3 Characteristics with Sonos blocking patents •5 Patent families, 31 patents
Premium Sound Device	50% <ul style="list-style-type: none"> •8 Characteristics •7 Characteristics relevant to Google Max •4 Characteristics with Sonos blocking patents •4 Patent families, 9 patents 	0% <ul style="list-style-type: none"> •8 Characteristics •0 Characteristics relevant to Google Home 	0% <ul style="list-style-type: none"> •8 Characteristics •0 Characteristics relevant to Google Mini 	0% <ul style="list-style-type: none"> •8 Characteristics •0 Characteristics relevant to Cast dongle

Explanation of Step 1 Percentages—Europe

	Google Home Max	Google Home	Google Mini	Cast Dongle Devices
Connected Playback Device (Standalone)	7%	0%	0%	0%
	•12 Characteristics •11 Characteristics relevant to Google Max •1 Characteristic with Sonos blocking patents	•12 Characteristics •9 Characteristics relevant to Google Home	•12 Characteristics •9 Characteristics relevant to Google Mini	•12 Characteristics •8 Characteristics relevant to Cast Dongle
Voice Assistant Device (Standalone)	0%	0%	0%	0%
	•2 Characteristics •2 Characteristics relevant to Google Max	•2 Characteristics •2 Characteristics relevant to Google Home	•2 Characteristics •2 Characteristics relevant to Google Mini	•2 Characteristics •0 Characteristics relevant to Cast Dongle.
Multi-Device Platform	20%	20%	20%	20%
	•5 Characteristics •5 Characteristics relevant to Google Max •1 Characteristic with Sonos blocking patents	•5 Characteristics •5 Characteristics relevant to Google Home •1 Characteristic with Sonos blocking patents	•5 Characteristics •5 Characteristics relevant to Google Mini •1 Characteristic with Sonos blocking patents	•5 Characteristics •5 Characteristics relevant to Cast Dongle •1 Characteristic with Sonos blocking patents
Premium Sound Device	25%	0%	0%	0%
	•8 Characteristics •7 Characteristics relevant to Google Max •2 Characteristics with Sonos blocking patents	•8 Characteristics •0 Characteristics relevant to Google Home	•8 Characteristics •0 Characteristics relevant to Google Mini	•8 Characteristics •0 Characteristics relevant to Cast dongle

Step 1: Feature List

1. Connected Playback Device. A stand-alone, network-enabled media player, speaker, or playback device.

1.1 Connected Playback Device Setup. Setup of the connected playback device.

1.1.1 Player Setup. Setup of connected playback device including setting up accounts and network access.

1.1.2 Streaming Service(s) Setup. Setup of streaming service account(s) on the playback device.

1.2 Wi-Fi Streaming. Obtaining media content for playback via wi-fi.

1.2.1 LAN/Local Source. Obtaining media content for playback from a local source on the same local area network (LAN) as the connected playback device.

1.2.2 Remote Source. Obtaining media content for playback from a remote source via a wide area network (WAN) (i.e., from the cloud).

1.3 Single Streaming Service Support. Playback device can only obtain media for playback from one streaming service.

1.3.1 Single Streaming Service Registration. Registering a single streaming service with the playback device thereby enabling the playback device to use streaming service credentials to access content from the streaming service.

1.3.2 Cloud Queue. The playback queue from which a playback device sources media items to play back is stored in and driven from the cloud. When the playback device needs to update its queue, it requests the items from the cloud.

1.4 Multiple Streaming Service Support. Playback device can obtain media from at least two streaming services for playback.

1.4.1 Switching between Music Services. Playback device can switch between obtaining media content from different streaming services for playback.

1.4.2 Universal Search. The playback system can simultaneously search across media catalogs of multiple streaming services.

Step 1: Feature List

Cont.

1.5 Line-In. Playback device has a physical media input port (e.g., aux port, optical port) or virtual input interface.

1.5.1 Physical Line-in Source Switching. Playback device can switch between playing back media received via the physical input port and media obtained via a virtual input source.

1.5.2 Virtual Line-in Source Switching. Non-physical, digital input for media. Playback device can switch between playing back media received via the physical input port and media obtained via the virtual input.

1.6 Line-Out. An audio output port.

1.7 Bluetooth.

1.7.1 Setup. Bluetooth used in playback device setup process, for example, to pass network credentials.

1.7.2 Real-Time Streaming. Playback device receives a real-time media stream via Bluetooth for playback.

1.8 (Software) Control Interface. Control interface on a device distinct from the playback device.

1.8.1 Guest Access. Access to a playback device by a guest to thereby enable a guest to use a playback device without receiving network or other account credentials.

1.8.2 Native Control. Control interface provided by the same party as the playback device

1.8.3 Direct Control. Control of a playback device via a third-party's control interface.

1.9 (Hardware) Control Interface. Control interface on the playback device (e.g., touch interface).

1.10 Power and Power Management.

Step 1: Feature List

Cont.

1.11 Fault Detection/Recovery.

1.12 (Software/Firmware) Feature Updates. New features can be added to the playback device.

1.12.1 Firmware/Configuration Updates. New features can be added to the playback device through firmware updates.

1.12.2 App Store. New features can be added to the playback device by installing apps.

1.12.3 Skills. New features can be added to the playback device by enabling skills.

1.13 Industrial Design. Design of the connected playback device.

Step 1: Feature List

2. Voice Assistant Device. A stand-alone player, speaker, or playback device with a built-in voice assistant.

2.1 Smart Assistant. Voice assistant.

2.1.1 Machine Learning. Voice assistant technology that uses machine learning to respond to queries or commands in a voice command.

2.1.2 Search Expertise. Search engine used to power responses to voice commands.

2.3 Voice Detection. Device detecting that a voice command is being/has been uttered.

2.3.1 Mic Array. Voice assistant device includes a mic array to detect voice commands.

2.3.2 Beam Forming. Device includes a microphone array capable of beamforming.

2.3.3 Wake Word Engine. Processing on the player to detect utterance of a wake word.

2.3.4 Arbitration. Processing on the player to determine which player is to respond to a voice command when more than one voice capable player detects the voice command.

2.3.5 Voice Capture Processing. Processing on the player to clean up the voice capture before transmitting for speech-to-text conversion.

Step 1: Feature List

3. Multi-Device Platform. Multi-room.

3.1 Multi-Device Control.

3.1.1 Group Content/Playback Control.

3.1.2 Group Formation.

3.1.3 Group Volume.

3.1.4 Zone Scenes.

3.1.5 Group Navigation and Maintenance.

3.1.6 Source Switching.

3.1.7 Multiple Controllers.

3.2 Multi-Device Playback (SW).

3.2.1 Synchronized Playback.

3.2.2 Audio Distribution.

3.3 Multi-Device Voice.

3.3.1 Multi-Device Voice Input.

3.3.2 Multi-Device Voice Output.

Step 1: Feature List

3. Multi-Device Platform. Multi-room.

3.4 Smart Home Integration. Voice assistant device is used to control internet of things.

3.4.1 Output/Action Device. Voice assistant device can execute commands or output audio on a default device or on a particular device(s) targeted in the voice command.

3.4.2 IoT Scenes. Scenes or routines used to automatically trigger certain functions in response to particular events.

3.4.3 Education and Entertainment Functions.

3.5 Multi-Device Networking.

3.5.1 Ad-Hoc/STP Configurations.

3.5.2 Direct Routing/Communication from GC to GM

3.5.3 Fault Tolerance.

3.5.4 Group Coordinator Selection.

3.5.5 Changing Group Coordinator.

3.5.6 Setup.

Step 1: Feature List

4. Premium Sound Device. Hardware and software features of a playback device to produce premium sound.

4.1 Orientation. Playback device can be placed in different orientations.

4.1.1 Orientation-Based Sound Shaping. Sound of the playback device can be shaped based on its current orientation.

4.2 Bonded Zones.

4.2.1 Stereo Pair.

4.2.2 Consolidated Players. A group of playback devices that as a group playback a full frequency range or channel set. For example, 3.1 surround, 5.1 surround, etc.

4.3 Custom Transducers. Purpose-designed transducers.

4.3.1 Woofers. Purpose-designed woofers.

4.3.2 Tweeters. Purpose-designed tweeters.

4.4 Calibration. Audio playback can be calibrated based on environmental conditions.

4.4.1 Built-In Mics. Audio playback can be calibrated using audio captured by mics internal to the playback device.

4.4.2 External Mics. Audio playback can be calibrated using audio captured by mics external to the playback device.

4.4.3 Audio Processing Algorithm Calculation. Algorithm to calculate audio settings adjustments based on audio captured by mics.

4.5 Lossless Streaming.

4.5.1 Sufficient Processing Power and Network Capabilities.

4.5.2 Compatible DSP.

Step 1: Feature List

Cont.

4.6 Sound Field Control.

4.6.1 Custom Transducers. Purpose-designed transducers.

4.6.2 Audio Signal Processing.

4.6.3 Acoustic Baffle. Playback device includes a mechanical structure to control directionality of audio.

4.7 Custom Amplifiers.

4.8 Enclosure.

4.8.1. Speaker Grill.

Step 2: Desirable Features

I. Google Website Analysis

- ♦ Google Home Mini “Overview” and “Learn” Websites
- ♦ Google Home “Overview” and “Learn” Websites
- ♦ Google Home Max “Overview” and “Learn” Websites
- ♦ Google Chromecast Audio Dongle Website
- ♦ Desirable Feature Breakdown

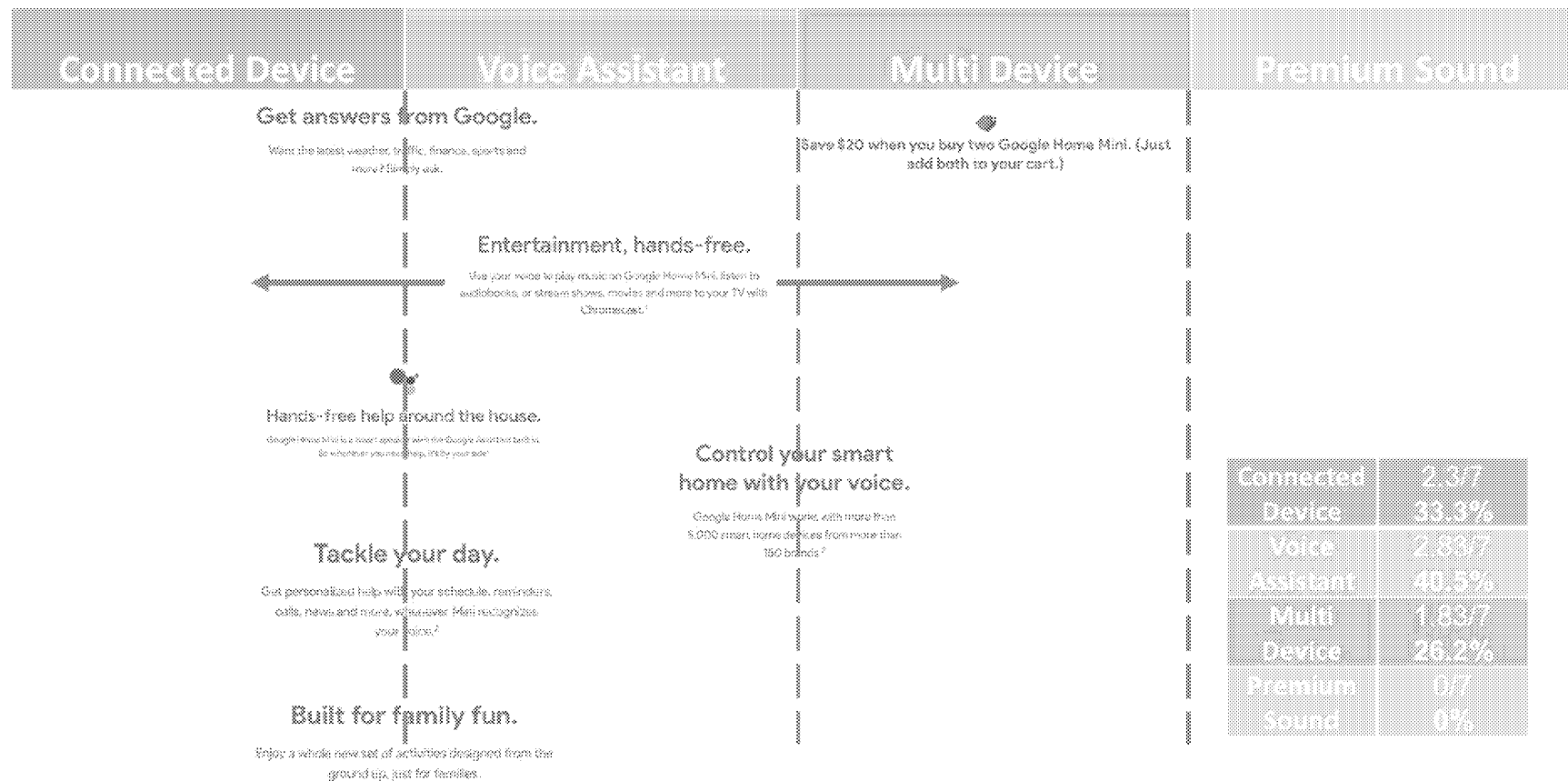
II. Google Home Press

- Press/Tweets
- Articles

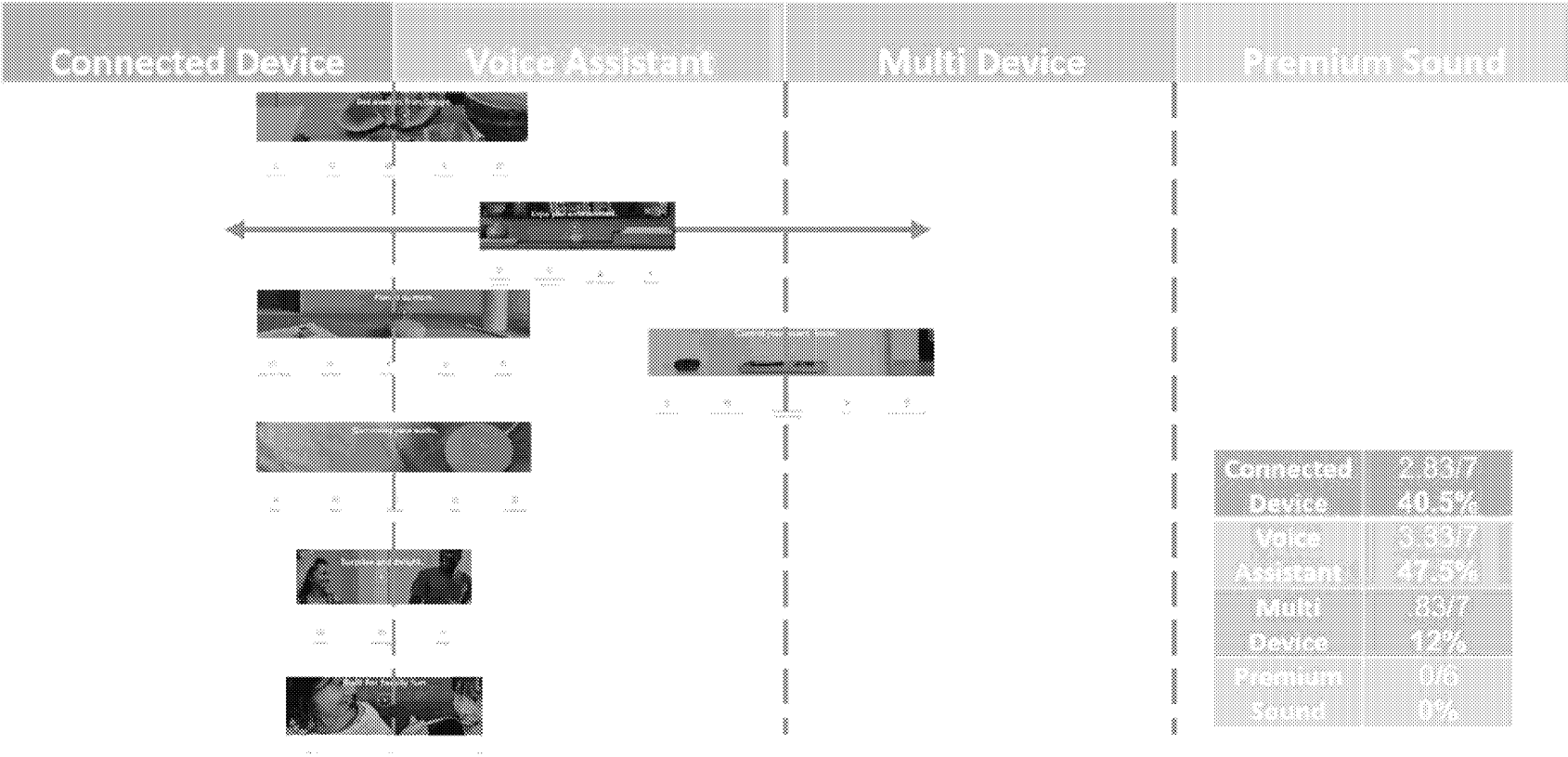
III. Ecosystem Analysis

- Chromecast Primary
- Chromecast Secondary

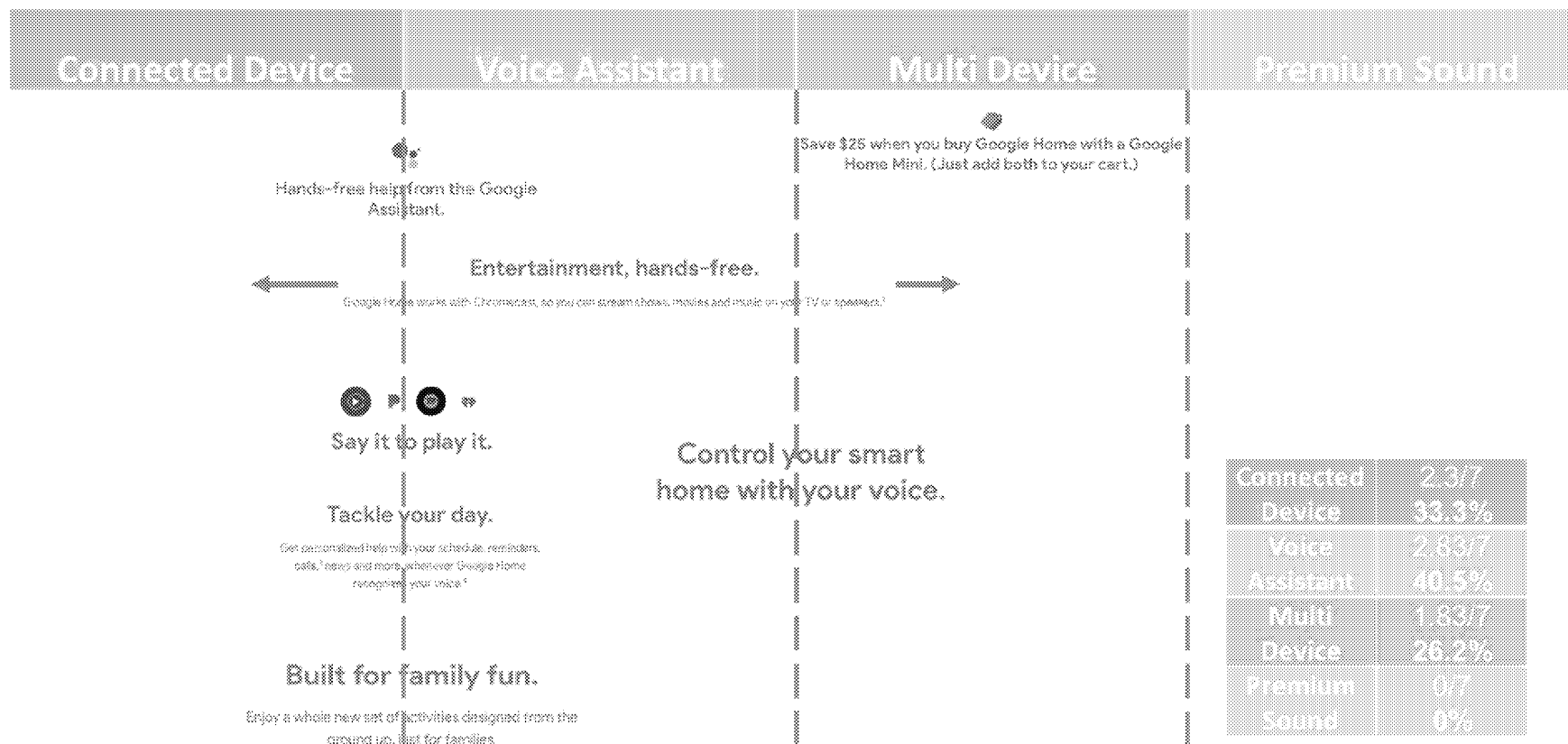
Google Home Mini “Overview” Website



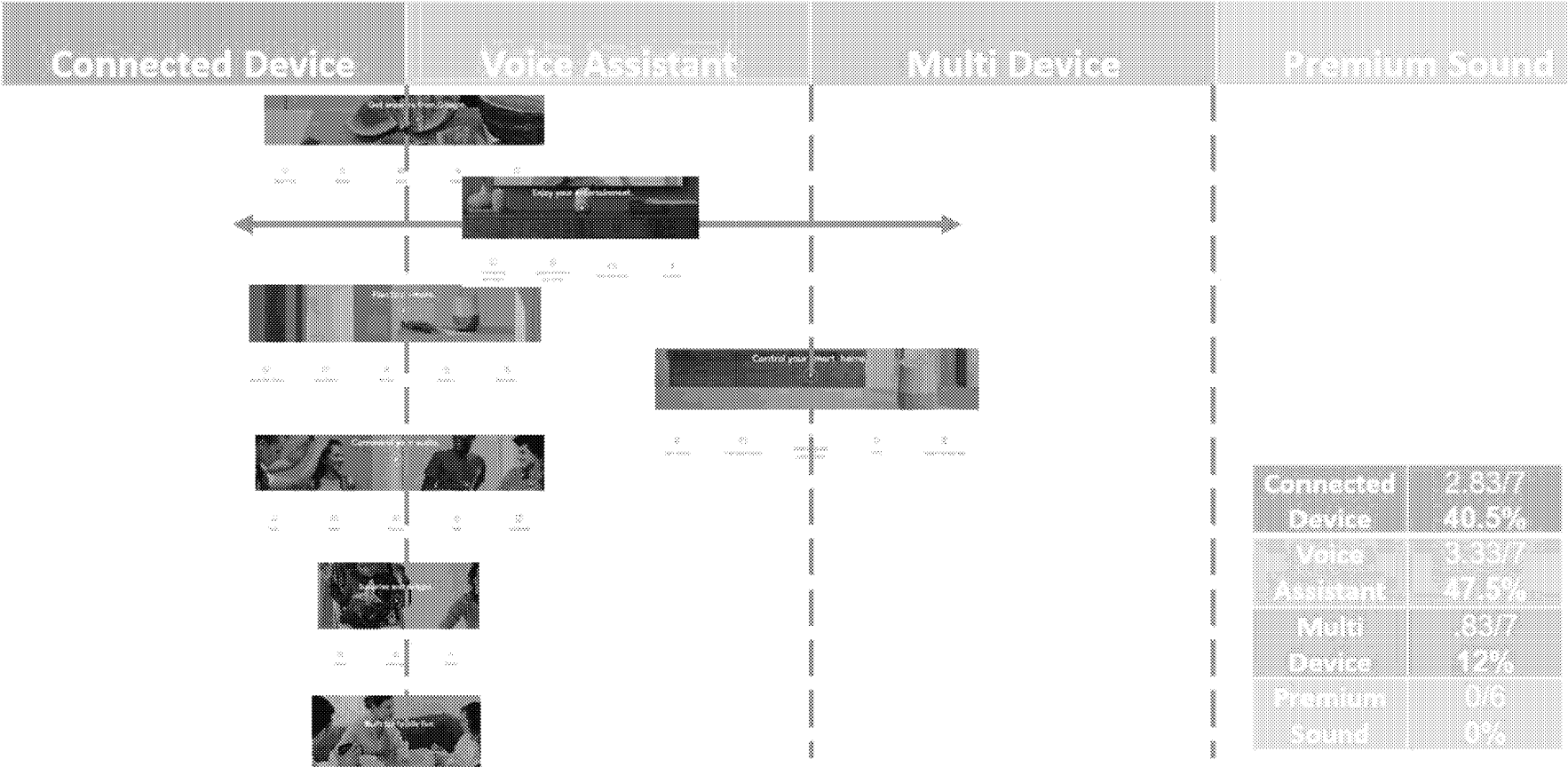
Google Home Mini “Learn” Website



Google Home “Overview” Website



Google Home “Learn” Website



Google Home Max "Overview" Website

The website layout is divided into four main columns, each representing a feature of the Google Home Max. A central navigation bar with arrows points left and right, and a summary table is located in the bottom right corner.

Connected Device

Play it your way.

Stream over Wi-Fi from compatible apps on your phone or laptop, play songs right over Bluetooth®, or plug in your record player using a stereo cable.

40+ million songs at your command.

Voice Assistant

Say what you want to hear.

With far-field voice control, Max can hear you across the room, even while your music is playing.

Control your smart home with your voice.

Just as helpful.

Max gives you hands-free help from the Google Assistant. Ask it questions, tell it to do things and even control smart home devices.¹

Multi Device

Sync up speakers in your house.

Max connects with other Google Home devices and your speakers using Chromecast Audio, so you can blast your tunes throughout the house.

Buy a Google Home Max and get a Google Home Mini on us. (Just add both to your cart.)

Premium Sound

Feel the music.

Google Home Max is made for the ultimate in high fidelity.

Introducing Smart Sound.

With Smart Sound, Google Home Max uses machine learning to automatically adjust the equalizer settings to reproduce the sound of your room. This gives you the most realistic sound — wherever you put it.

An even wider stereo image.

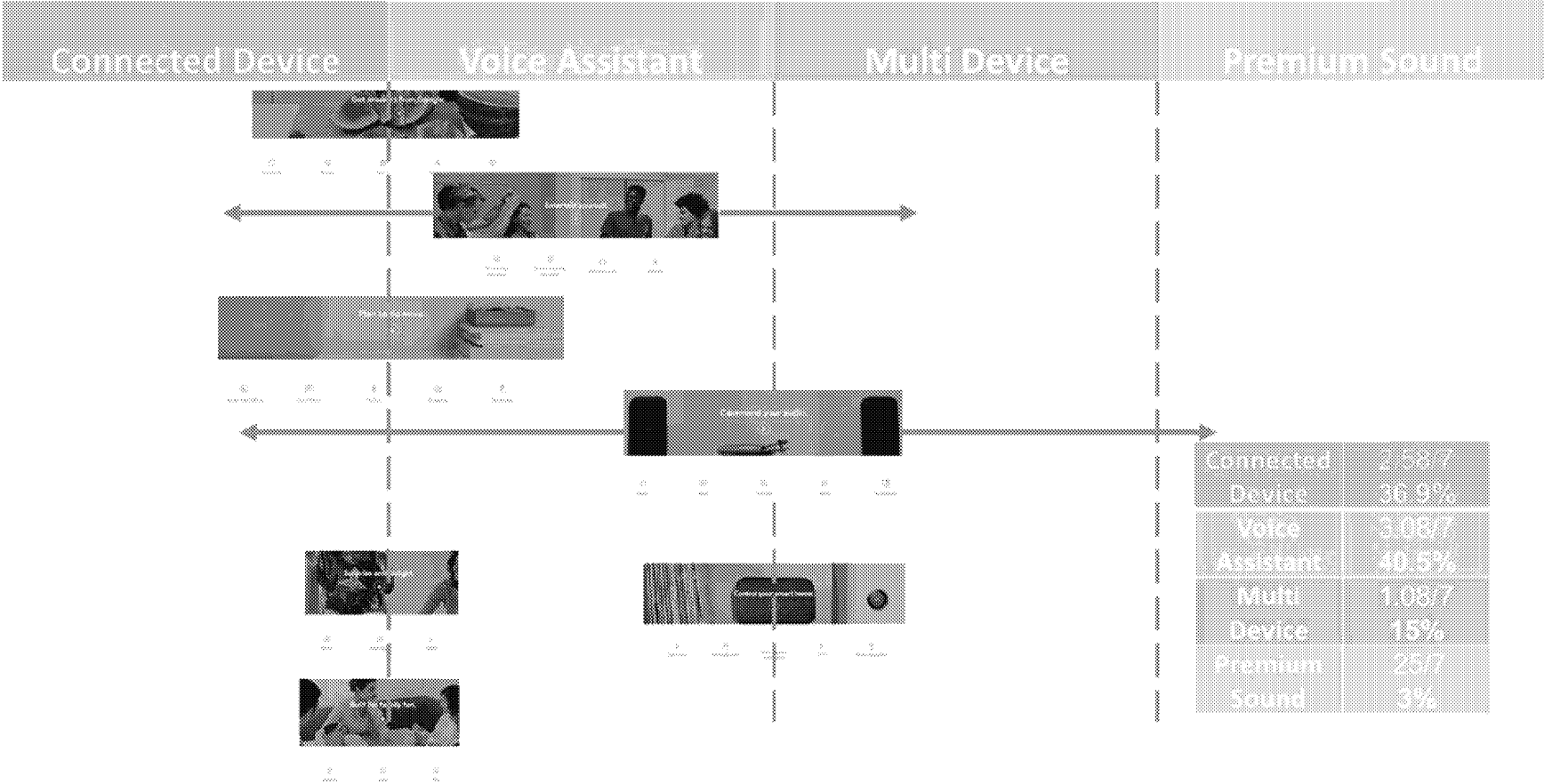
Wirelessly pair two for room-filling stereo separation.

Fits your space.

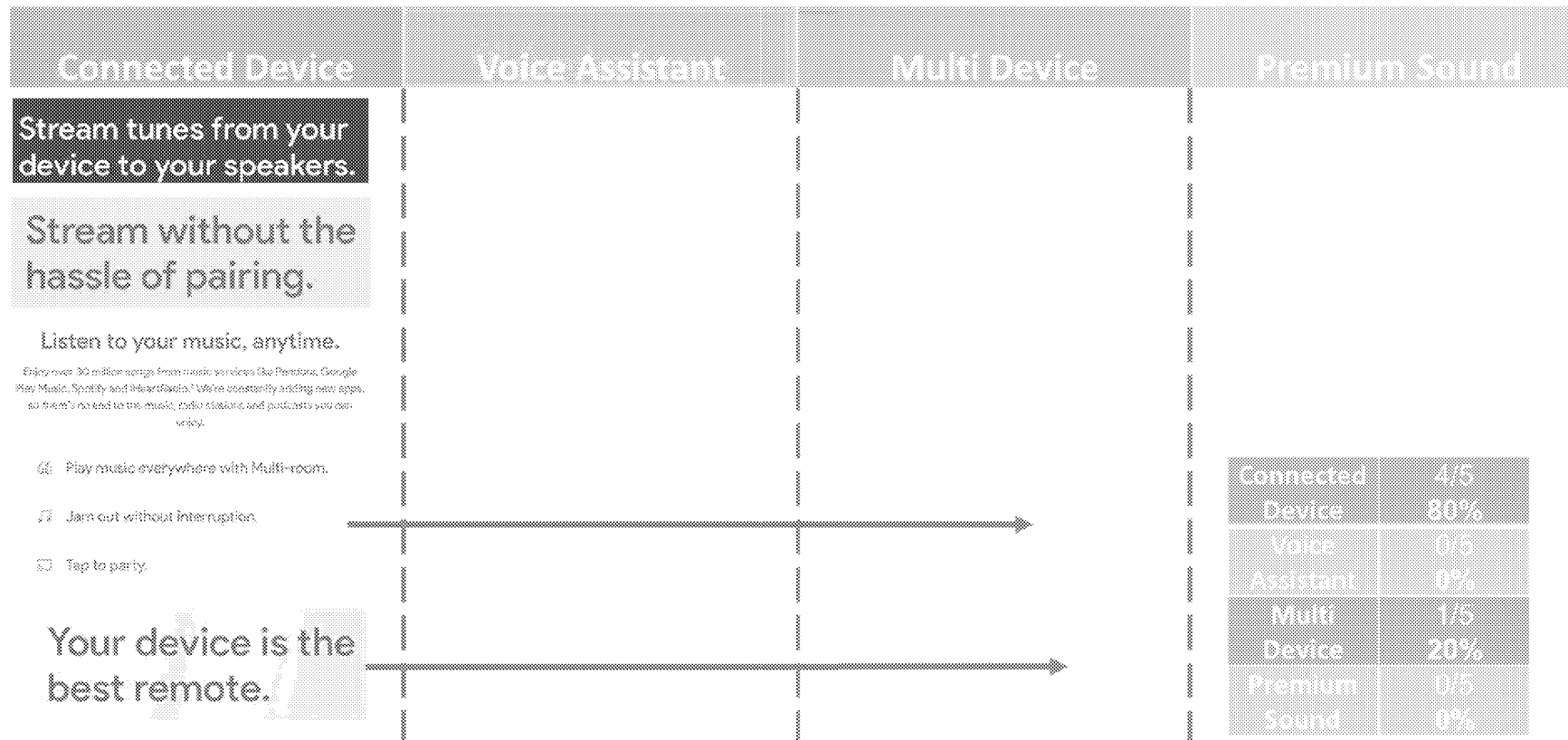
With a carefully crafted shape and sensor for orientation, you can place Google Home Max vertically or horizontally.

Connected Device	1.8/11 16.6%
Voice Assistant	2.3/11 21.2%
Multi Device	3.3/11 30%
Premium Sound	3.5/11 32.2%

Google Home Max “Learn” Website



Chromecast Audio Dongle Website



Desirable Features Breakdown

	Google Home Mini	Google Home	Google Home Max	Chromecast Audio
Connected Device	37%	37%	25%	80%
Voice Assistant	44%	44%	30%	0%
Multi Device	19%	19%	24%	20%
Premium Sound	0%	0%	21%	0%

Google Press/Tweets

Press and tweets relating to Google Home confirm the features breakdown from Google's website. Rick Osterloh has tweeted numerous articles touting the features of

Google Home products:



Rick Osterloh @rosterloh · Feb 7

This makes the case very clear. Purchase a Google Home Max if you're thinking about a high end smart speaker that sounds great.



8 reasons you should buy a Google Home Max instead of an Apple H...

Google Home Max and Apple's HomePod both deliver great sound for a similar price — but the Max has several advantages.

bestreviewfinder.com

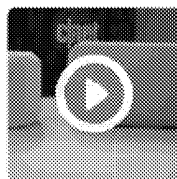
Article tweeted by Rick Osterloh identifies 8 reasons to buy a Google Home Max. Four of those reasons relate to multi-device and/or premium sound.

Of the 5 rounds described in the video tweeted by Rick Osterloh, 3 relate to multi-device and premium sound.



Rick Osterloh @rosterloh · Feb 23

Google Home Max vs Homepod - Prizefight! @CNET



Prizefight: Apple HomePod vs. Google Home Max - ...

It's Apple's HomePod vs. the Google Home Max. Who's got the sound and smarts to reign supreme? It's a Prizefight punch-out for smart speaker supremacy.

cnet.com

1

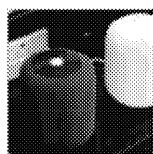
2

28



Rick Osterloh @rosterloh · Feb 11

"The bottom line? Overall the sound of the HomePod was a bit muddy compared with what the Sonos One and Google Home Max delivered."



The Apple HomePod Sounds Good, but Other Smar...

In Consumer Reports audio testing, the Google Home Max and Sonos One edge ahead of the Apple HomePod, but all three speakers serve up very good sound quality.

consumerreports.org

Article tweeted by Rick Osterloh notes that "unlike the Home Max or the Sonos One, the HomePod doesn't offer stereo pairing, or Sonos-style multiroom capability . . . yet."

8

9

58

Google Press/Marketing



With Google, it always seems to come back to that search box. The company might be unveiling a large family of products. It might have hired a couple thousand new phone engineers. **It might even be serious about creating products that are directly competitive with Apple, Samsung, Amazon, Bose, Sonos, and many others. It is doing all of those things. For the time being, however, it's not doing them at a massive scale — yet.**

But after talking to Osterloh, it's very clear that Google wants to.



Source: The Verge, October 4, 2017

Google Press/Marketing

ONE MAN'S QUEST TO MAKE GOOGLE'S GADGETS GREAT

Google is leaning on Rick Osterloh to completely rewrite its strategy for hardware, with one core goal: Put its virtual assistant everywhere in people's lives.

But the nature of computing is changing, and its **next phase won't revolve around app stores and smartphones. It will center instead on artificially intelligent devices that fit seamlessly into their owners' everyday lives.** It will feature voice assistants, simple wearables, smart appliances in homes, and augmented-reality gadgets on your face and in your brain.

In other words, the future involves a whole lot more hardware, and for Google that shift represents an existential threat.

For the new hardware team, the task was clear: **Find more ways to get Google Assistant in front of people** and build a sustainable business around it



Source, Wired.com, February 8, 2018

Google Press/Marketing

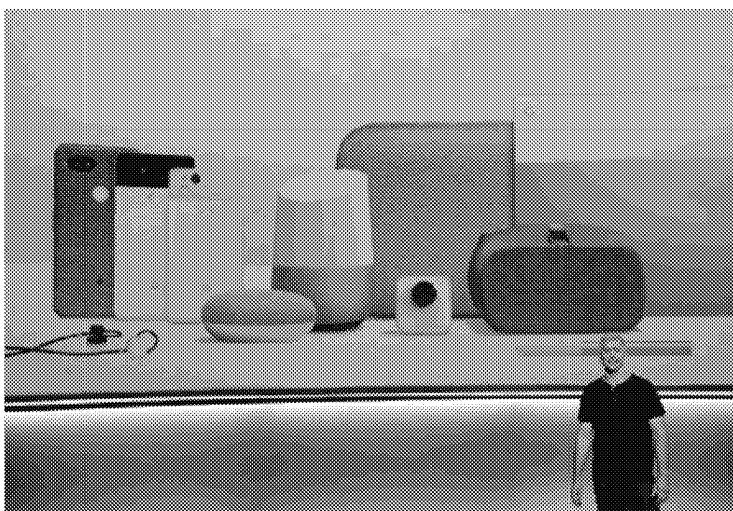
Google Is Finally Getting Serious About Hardware. Here's Why.

We're moving into an era where, more than ever before, devices are simply a vehicle for user experiences.

...

When I asked Osterloh to name his favorite new Google device, he gave me the obligatory "I love all my children" line. Then he singled Home Max as one of the children he's most excited

about. "It's a really interesting, innovative product," he said. "It not only combines our Assistant work, but all of the stuff we've done on Smart Sound where it adjusts to the room dynamics and changes the sound levels based to really match the room. I think it's a terrific experience." Google's AI is behind that experience too.



Source: Forbes.com, October 16, 2017

Google Press/Marketing

Google Joins Azione, Pushing DIY Voice Control to Smart-Home Pros

Azione Unlimited, a buying group for home-technology pros, adds another DIY vendor to the roster -- Google Home -- shortly after Sonos joins the group.

Google Home has joined Azione Unlimited, a leading buying group in the home-technology channel with nearly 200 dealer members. The announcement comes just two weeks after another DIY vendor, Sonos, joined the group. With Sonos offering native Amazon Alexa in its new Sonos One speakers, Azione now represents the top two voice-control platforms **in the professional installation channel**.

Here's what Azione had to say about the Google deal in a press release no doubt vetted by Google's expansive PR and legal teams:

Delivering high-quality audio and voice-activated personal assistant services, the Google Home portfolio is well-suited for both custom integration and DIY projects, easily **integrating with more than 1,500 smart home devices from over 225 brands**. Users can access more than 1 million actions to help to organize households, tackle everyday tasks, and present entertainment in a whole new way. Features include searching via Google; Voice Match; playing music, including via Bluetooth; music streaming via Spotify, Pandora and other popular services; hands-free phone calls; and local business search.

Source: CEPro.com, March 28, 2018

Google Press/Marketing



Take your music to the next level



Fill your home with music

Play and control music in every room by grouping multiple Google Home speakers.

[Learn how >](#)

Play my weekend playlist on all speakers

Turn up the volume

Source: Google Marketing Email, May 12, 2018

Google Press/Marketing

Google Home can now connect to any Bluetooth speaker

By Nick Pino March 28, 2018 Audio

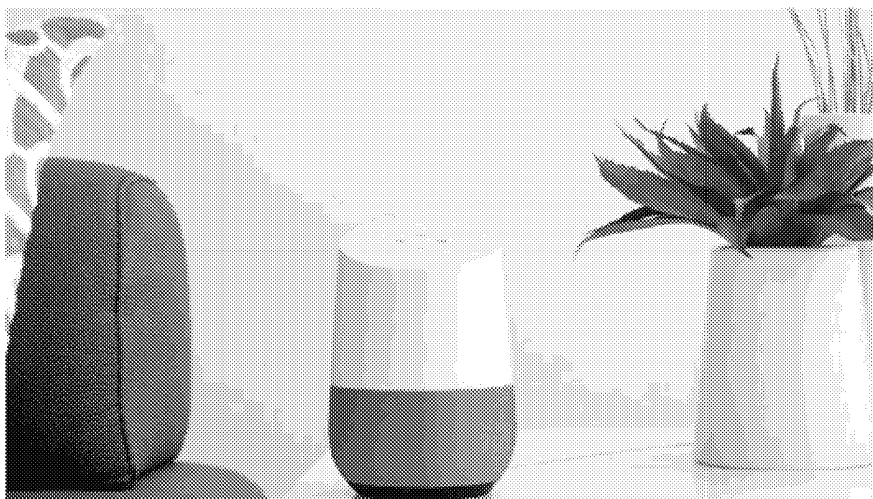
Google Home's Bluetooth sharing feature casts shade on Sonos

If you've been eyeing a multi-room Sonos, you might want to hold off - Google Home has a new trick up its sleeve that can turn any old Bluetooth speaker into a connected part of a multi-room audio setup.

...

Once tethered to your Google Home, you'll be able to ask Google Assistant to play music on your other speakers either by itself or part of a larger group.

The trick here is that Google Home devices are just using Bluetooth to funnel music from its connected streaming



services to the Bluetooth speaker. Which means your speaker needs to be on at all times to receive the music and it doesn't necessarily imbue the Bluetooth speaker with Google Assistant's intelligent voice recognition software, obviously. If you want to make a request to change the song, you'll have to be within shouting distance of the Home.

...

Despite a few quirks with the system, this is still a major upgrade for the Home, enabling you to form multi-room systems piece-by-piece with old Bluetooth speakers at a far cheaper price than a Sonos system.

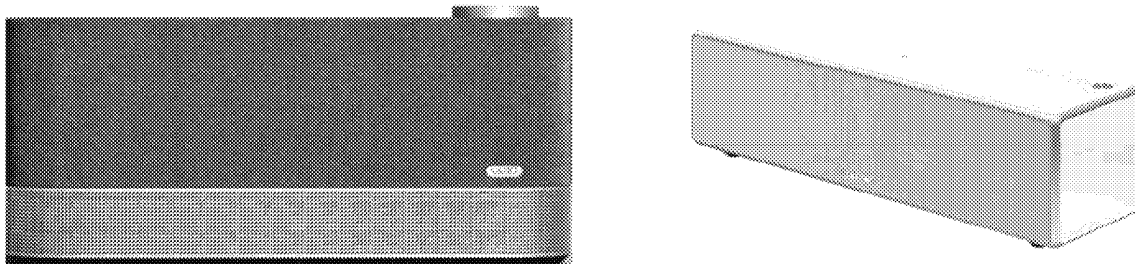
Source: TechRadar.com, March 28, 2018

Ecosystem Analysis






Chromecast Primary Devices: Products from Sony, LG, and JBL:



Chromecast Secondary Analysis: Products from Vizio and Sony:



Chromecast Primary: JBL Link Callouts

Google Feature	Non-Google Feature				
<p>LINK speakers deliver exceptional sound with the intelligence of Google Assistant.</p>  <p>Legendary sound, now smarter.</p> <p><i>"Ask Google, play some rock music."</i></p>	 <p>Take the party outside with LINK10 and LINK20.</p> <p><i>"Take your JBL Link10 and Link20 to the beach and enjoy the sounds of summer with your Link10 and Link20."</i></p>				
<p>Hands-free help from the Google Assistant</p> <p><i>"Get recipes, play songs, make your to-do list, and more with Google Assistant."</i></p>  <p><i>"OK Google, add milk to my shopping list."</i></p>					
 <p>Control your smart home</p> <p><i>"Ask your Link10 to turn on the lights in your living room with Google Assistant."</i></p>					
<p>Multi-room audio experience</p> <p><i>"Stream music across all your Chromecast-enabled speakers to enjoy the same song in every room. Or, play different songs in different rooms to create a multi-room audio experience."</i></p>  <p><i>"OK Google, play some pop in all speakers."</i></p>	<table> <tr> <th>Google Feature</th><th>Non-Google Feature</th></tr> <tr> <td>5/5 (83%)</td><td>1/6 (17%)</td></tr> </table>	Google Feature	Non-Google Feature	5/5 (83%)	1/6 (17%)
Google Feature	Non-Google Feature				
5/5 (83%)	1/6 (17%)				



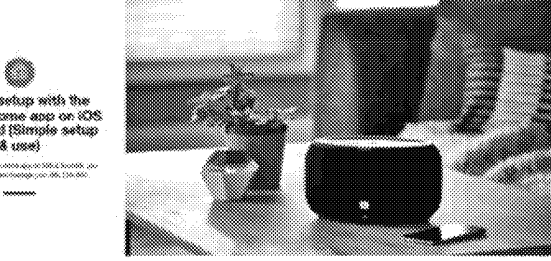
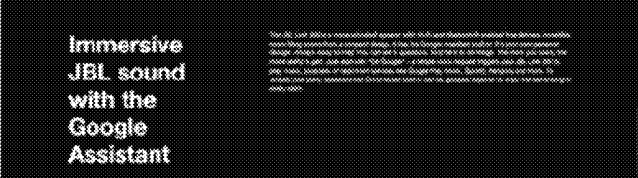
Chromecast Primary: JBL Link 10 Callouts

Google Feature	Non-Google Feature
 <p>Get help from your Google Assistant</p> <p><small>Use Chromecast to help you get the most out of your JBL Link 10. Just ask Google Assistant for help with anything you need.</small></p>	
 <p>Hands-free voice control</p> <p><small>Use Chromecast to control your JBL Link 10 with your voice. Just say "Hey Google" and ask for anything you need.</small></p>	
 <p>Simple setup with the Google Home app on iOS & Android (Simple setup & more)</p> <p><small>Use the Google Home app to set up your JBL Link 10. It's easy and takes just a few minutes.</small></p>	
<p>Immersive JBL sound with the Google Assistant</p> <p><small>The JBL Link 10 is a 10W Class D amplifier with 10W of power. It's designed to deliver the best sound quality possible. With Chromecast, you can stream music from your phone, tablet, or computer to your JBL Link 10. Just say "Hey Google" and ask for anything you need.</small></p>	
Google Feature	Non-Google Feature
4/4 (100%)	0/4 (0%)

Chromecast Primary: JBL Link 20 Callouts

Google Feature	Non-Google Feature				
					
					
					
					
	<table><tr><th>Google Feature</th><th>Non-Google Feature</th></tr><tr><td>4/4 (100%)</td><td>0/4 (0%)</td></tr></table>	Google Feature	Non-Google Feature	4/4 (100%)	0/4 (0%)
Google Feature	Non-Google Feature				
4/4 (100%)	0/4 (0%)				


Chromecast Primary: JBL Link 300 Callouts

Google Feature	Non-Google Feature								
 <p>Get help from your Google Assistant</p> <p>Use Link 300 to help you control your home. Just ask Google Assistant to play music, adjust the lights, or even to call a friend. It's all possible with Link 300.</p>									
 <p>Hands-free voice control</p> <p>Use Link 300 to control your music, lights, and more. Just ask Google Assistant to play music, adjust the lights, or even to call a friend. It's all possible with Link 300.</p>									
 <p>Simple setup with the Google Home app on iOS & Android (Simple setup & use)</p> <p>Use the Google Home app to set up Link 300. It's easy and takes just a few minutes. You can also use the app to control your music, lights, and more.</p>									
 <p>Immersive JBL sound with the Google Assistant</p> <p>Use Link 300 to enjoy immersive JBL sound. Just ask Google Assistant to play music, and you'll hear it all. It's all possible with Link 300.</p>									
<table border="1"> <thead> <tr> <th>Google Feature</th><th>Non-Google Feature</th></tr> </thead> <tbody> <tr> <td>4/4 (100%)</td><td>0/4 (0%)</td></tr> </tbody> </table>	Google Feature	Non-Google Feature	4/4 (100%)	0/4 (0%)	<table border="1"> <thead> <tr> <th>Google Feature</th><th>Non-Google Feature</th></tr> </thead> <tbody> <tr> <td>4/4 (100%)</td><td>0/4 (0%)</td></tr> </tbody> </table>	Google Feature	Non-Google Feature	4/4 (100%)	0/4 (0%)
Google Feature	Non-Google Feature								
4/4 (100%)	0/4 (0%)								
Google Feature	Non-Google Feature								
4/4 (100%)	0/4 (0%)								

Chromecast Primary: JBL Link 500 Callouts

Google Feature	Non-Google Feature				
 <p>Get help from your Google Assistant</p> <p>Use the JBL Link 500 to ask Google Assistant to play music, set reminders, and more. Just say "Hey Google" or "Ok Google" to get help from your Google Assistant.</p>					
 <p>Hands-free voice control</p> <p>The JBL Link 500 is a voice-controlled speaker that lets you control your music, smart home devices, and more. Just say "Hey Google" or "Ok Google" to get help from your Google Assistant.</p>					
 <p>Simple setup with the Google Home app on iOS & Android (Simple setup & use)</p> <p>Set up the JBL Link 500 with the Google Home app on iOS or Android. It's easy to use and you can control your music, smart home devices, and more.</p>					
 <p>Immersive JBL sound with the Google Assistant</p> <p>The JBL Link 500 is a voice-controlled speaker that lets you control your music, smart home devices, and more. Just say "Hey Google" or "Ok Google" to get help from your Google Assistant.</p>					
<table> <tr> <th>Google Feature</th><th>Non-Google Feature</th></tr> <tr> <td>4/4 (100%)</td><td>0/4 (0%)</td></tr> </table>	Google Feature	Non-Google Feature	4/4 (100%)	0/4 (0%)	
Google Feature	Non-Google Feature				
4/4 (100%)	0/4 (0%)				

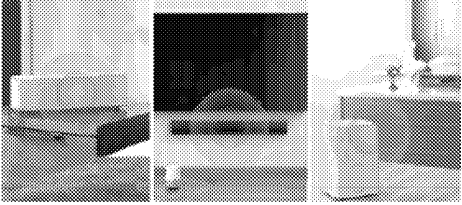



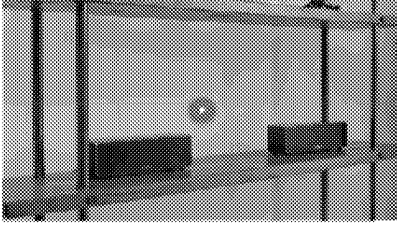
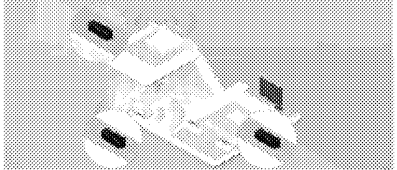
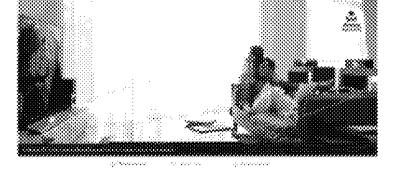
Chromecast Primary: Sony S50G Callouts

Google Feature	Non-Google Feature
<p>The smarter way to enjoy music</p> <p>Streamline your music experience</p> 	<p>360° sound in two rooms</p> 
<p>Meet your Google Assistant</p> <p>Use Google Assistant to control your Chromecast</p> 	<p>500+ high-quality sound</p> 
 <p>Sad stories</p> <p>My love</p>	<p>Intuitive design for your home</p> 
<p>Manage everything with</p> 	<p>Opened for 100%</p> 
 <p>Chromecast</p> <p>Chromecast</p> <p>Chromecast</p>	
Google Feature	Non-Google Feature
5/5 (100%)	4/9 (44%)

Chromecast Primary: LG WK7 Callouts

Google Feature	Non-Google Feature
 <p>AI Speaker Now Meets Exceptional Sound The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	 <p>High Resolution Audio With Hi-Fi audio, the LG WK7 speaker delivers rich, detailed sound that fills your room. It's the perfect way to enjoy your favorite music.</p>
 <p>Meet Your Google Assistant Ask it questions, and it'll do everything. The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	 <p>Clear Vocal & Enhanced Bass The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>
 <p>See Answers From Google The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	
 <p>Organize Your Day The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	
 <p>Expand Your Smart Home The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	
 <p>Make music in the Park The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	
 <p>LG ThinQ Technology The LG WK7 speaker is a smart way to enjoy premium sound technology. It features a powerful 360-degree sound field, so you can enjoy music from every angle.</p>	
<p>Google Feature</p> <p>1/9 (75%)</p>	<p>Non-Google Feature</p> <p>2/9 (22%)</p>

Chromecast Secondary: Sony SRS-ZR7 Callouts

Google Feature	Non-Google Feature
<p>Works with Google Home</p> <p>www.google.com/works-with-google-home</p>  <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p> <p>Learn more Get it now See more</p> <p>Easily access your music</p> <p>Use your Google Assistant to stream music from Google Play Music, YouTube Music, and more.</p> <div> <div>  <p>Chromecast built-in</p> <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p> </div> <div>  <p>Spotify</p> <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p> </div> </div> <p>Stream with Chromecast built-in</p> <p>www.google.com/chromecast/built-in</p>  <p>Learn more Get it now See more</p>	<p>The Way The Artists Truly Intended</p> <p>Experience Hi-Res Audio. Hi-Res Audio is a digital audio format that provides a higher resolution than standard CD quality, with 24-bit/192kHz sampling rate. Hi-Res Audio is a digital audio format that provides a higher resolution than standard CD quality, with 24-bit/192kHz sampling rate.</p>  <p>Save every note, everywhere</p> <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p>  <p>Immerse yourself in sound</p> <p>Experience the power of 360 Reality Audio. 360 Reality Audio is a digital audio format that provides a higher resolution than standard CD quality, with 24-bit/192kHz sampling rate. 360 Reality Audio is a digital audio format that provides a higher resolution than standard CD quality, with 24-bit/192kHz sampling rate.</p>  <p>A soundtrack for every room</p> <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p>  <p>Even better together</p> <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p>  <p>Superior Sound Quality</p> <p>Experience the power of 360 Reality Audio. 360 Reality Audio is a digital audio format that provides a higher resolution than standard CD quality, with 24-bit/192kHz sampling rate. 360 Reality Audio is a digital audio format that provides a higher resolution than standard CD quality, with 24-bit/192kHz sampling rate.</p>  <p>Sensable Design</p> <p>Stream music from Google Assistant, Google Play Music, YouTube Music, and more.</p> 
<p>Google Feature</p> <p>3/10 (30%)</p>	<p>Non-Google Feature</p> <p>7/10 (70%)</p>

Chromecast Secondary: Vizio Crave Callouts

Google Feature	Non-Google Feature
----------------	--------------------

Crave Pro™ Wireless Speaker.

Impassive audio. Wireless power. Surrounding sound. Brooming bass. Chromecast built in.

Profoundly Powerful.

Crave Pro delivers enhanced audio performance. Experience 102 decibels of immersive audio, low rumbling bass and beautiful bold design.

Chromecast built in

Streamers of music at songs, podcasts, audiobooks and more without a second thought. [Learn more](#)

Multi-Room Pairing.*

Connect up to 100 Crave Pro or Crave Wireless Speakers to create a multi-room audio system. [Learn more](#)

Bold Design

With an edgy body, seven bold color audio speakers and a sleek design, Crave Pro looks as good as it sounds. [Learn more](#)

Chromecast built in

Connect More with Chromecast.

Chromecast built in

Use your voice to control your speakers with Google Home.

Google Home

Engineered For The Everyday.

Sensational Sound.

Experience sensational sound with 102 decibels of power, featuring custom audio drivers and audio technology from 102.

102.

Sensational Sound.

102 decibels of power, featuring custom audio drivers and audio technology from 102.

40.

Brooming Bass.

Featuring 40 decibels of power, featuring custom audio drivers and audio technology from 102.

Balanced sound...

Multi-Room Pairing.

Turn Your Phone Into The Ultimate Remote.

Use your phone to control your speakers with Google Home.

Enhance Your Audio Experience.

Google Feature	Non-Google Feature
----------------	--------------------

2/9 (22%)

7/9 (78%)